## Control Strategy Tool (CoST) Overview

CoST allows users to estimate the emission reductions and costs associated with future-year control strategies, and then to generate emission inventories with the control strategies applied. CoST tracks information about control measures, their costs, and the types of emissions sources to which they apply. The purpose of CoST is to support national- and regional-scale multi-pollutant analyses, primarily for Regulatory Impact Analysis (RIAs) of the National Ambient Air Quality Standards (NAAQS). CoST helps to develop control strategies that match control measures to emission sources using algorithms such as “Maximum Emissions Reduction”, “Least Cost”, and “Apply Measures in Series”. It currently contains control measure information for criteria pollutants, but does not contain any significant amount of control information for hazardous air pollutants (HAPs) or greenhouse gases (GHGs). We plan to add such information in the near future depending on resource and data availability.

The result of a control strategy run contains information that specifies the estimated cost and emissions reduction achieved for each control measure-source combination. CoST is an engineering cost estimation tool for creating controlled inventories and is not currently intended to model emissions trading strategies, nor is it an economic impact tool. Control strategy results can be exported to comma-separated-values (CSV) files, Google Earth-compatible (.kmz) files, or Shapefiles. The results can also be viewed in a graphical table that supports sorting, filtering, and plotting. The ‘Strategy Detailed Results’ from a strategy can also be merged with the original inventory to create controlled emissions inventories datasets that can be exported to files that can be input to the Sparse Matrix Operator Kernel Emissions (SMOKE) modeling system, which is used by EPA to prepare emissions inputs for air quality modeling.

CoST is a component of the Emissions Modeling Framework (EMF), which is currently being used by EPA to solve many of the long-standing complexities of emissions modeling. Emissions modeling is the process by which emissions inventories and other related information is converted to hourly, gridded, chemically speciated emissions estimates suitable for input to an air quality model such as the Community Multiscale Air Quality (CMAQ) model. The EMF supports the management and quality assurance of emissions inventories and emissions modeling-related data, and also the running of SMOKE to develop CMAQ inputs. Providing CoST as a tool integrated within the EMF facilitates a level of collaboration between control strategy development and emissions inventory modeling that was not previously possible. The concepts that have been added to the EMF for CoST are **“control measures**”, “**control strategies**”, and “**control programs**”. Control measures store information about available control technologies and practices that reduce emissions, the source categories to which they apply, the expected control efficiencies, and their estimated costs. A control strategy is a set of control measures applied to emissions inventory sources (in addition to any controls that are already in place) to accomplish an emissions reduction goal. Control programs represent

changes to emissions sources that are expected to occur between a base modeling year (e.g., 2005) and a future modeling year (e.g., 2020).

CoST supports data transparency and provides a wide array of options for developing control strategies. CoST uses a Control Measures Database to develop control strategies, and provides a user interface to that database. CoST has been developed to replace the older AirControlNET software. It has been applied to develop strategies for criteria pollutants, but has not yet been used for hazardous air pollutants (HAPs) due in part to the limited availability of control measures data for toxics. CoST has been used in some very limited analyses for greenhouse gases (GHGs). The main limiting factors in performing GHG analyses is the availability of (1) GHG emissions inventories at an appropriate level of detail, and (2) control measures for GHGs.

CoST is an extensible software system that provides several types of algorithms for developing control strategies:

- "Maximum Emissions Reduction"
- "Least Cost"
- "Least Cost Curve"
- "Apply Measures in Series"

The first three algorithms are typically used for point and area sources; the last one is usually used for mobile sources, for which most control techniques are independent of one another. Because CoST is an extensible system, it was possible to develop additional algorithms to create altered emissions inventories that are not considered "control strategies" in the traditional sense. These specialized algorithms are called "Annotate Inventory" and "Project Future Year Inventory". The "Annotate Inventory" algorithm examines the inventory to find sources with non-zero control efficiency fields that do not have control measure details specified. It then attempts to find control measures in the database that can apply to the source and finds the measure with a control efficiency closest to the specified efficiency and assigns that measure to the source. The "Project Future Year Inventory" strategy type uses the concept of control programs to project a base-year inventory to a future year. Control programs are sets of control measures and other adjustments (e.g., projection factors or plant closures resulting from consent decrees) that are used to estimate the effects of implementing a regulation that is "on the books" and is therefore considered when projecting a base-year emissions inventory to a future-year base emissions inventory. A future-year base inventory is what is typically used as an input to the traditional control strategy analyses that apply additional control measures to the emissions sources.